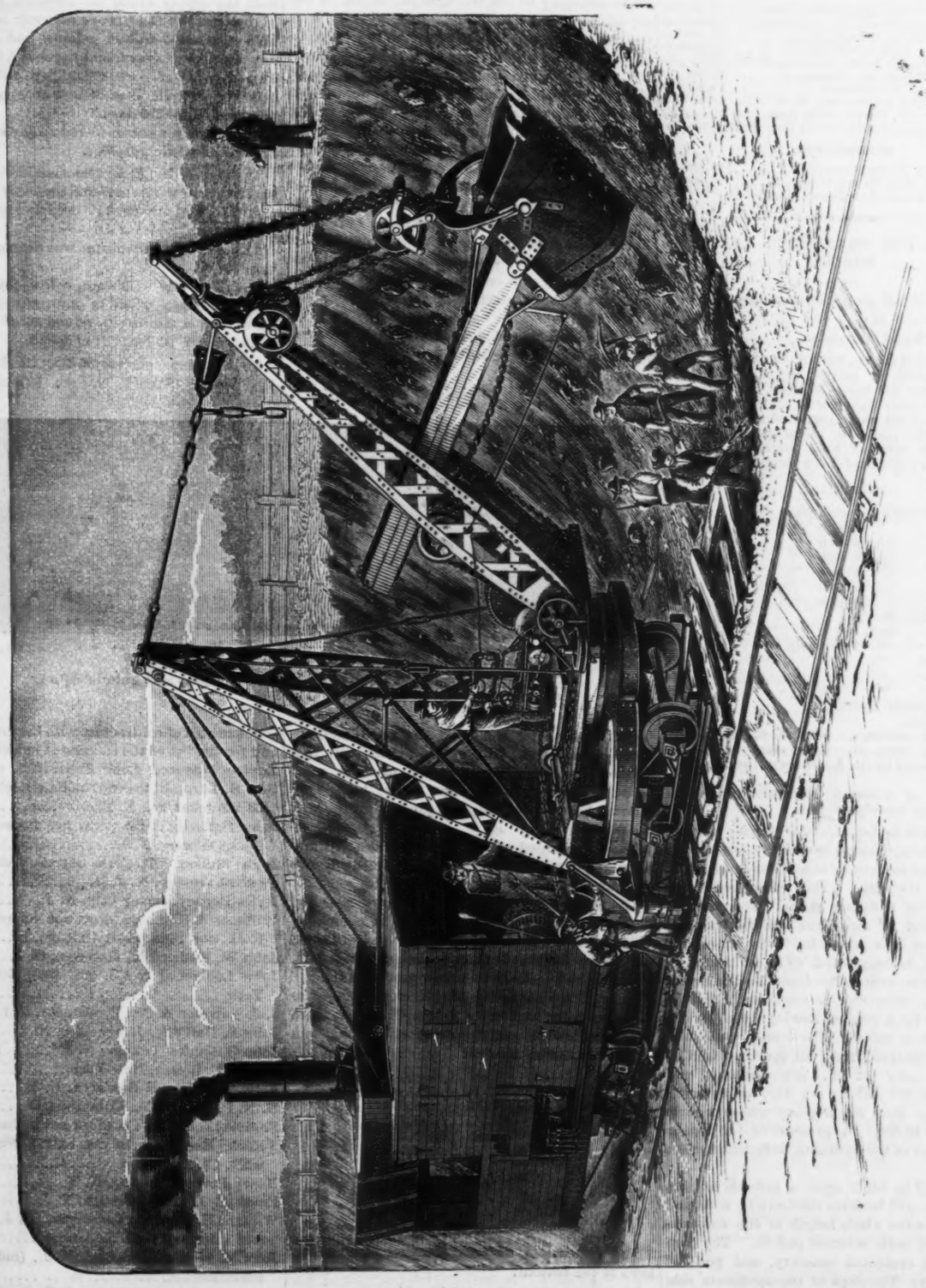
STEAM EXCAVATOR AND DUMPING CAR.

The accompanying engraving represents a combined excavator and dumping car built by the firm of Osgood & MacNaughton, 37 State street, Albany, N. Y., for use on the West Shore Railroad, and is so clear as to need but a brief description. It is particularly adapted for all building operations when it is desired to move large quantities of materials quickly and cheaply. The machinery is placed on a platform car, advanced on rails laid as the work progresses. In transportation the A frame is hinged at the lower end, so that it, together with the boom, can be lowered until it rests on an ordinary car placed in front, thus permitting of the passage under bridges. The weight of the machinery when at work is removed from its car, and is supported by a hydraulic-jack capable of supporting a load of 1,000 pounds to the square inch. The dipper has a capacity of 2 cubic yards, weight 3,000 pounds, and is built of steel, after the "Osgood" pattern. It is operated by a pair of engines geared to drums carrying the two separate hoisting chains, which accomplish the swinging without the help of other machines. The engine cylinders are 10 by 12 in. The operation of forcing the dipper into the bank is accomplished by two engines, 6¼ by 10 in., which are placed on the turntable. As these are reversing engines, complete control of the dipper is obtained both in depositing the load and holding it to the work. The boom is hinged to the turntable, and so connected with the A frame that it can be given the inclination to the work best suited for the purpose. A powerful spring being placed in the chain from the frame to the boom the destructive jars transmitted from the dipper to the machinery are much lessened. For use as a derrick the dipper and dipper handle are removed—an operation of but a few moments—when the machine is ready for any work suitable to a derrick. Approved friction clutches are used in all case instead of positive clutches, which are frequent causes of trouble. This machine has been in use for some time on the West Shore road, in a species of hard pan, which would otherwise have required blasting to loosen it. Notwithstanding the exceptional hard work to which it has been subjected no sign of weakness or rupture in any of its parts has appeared. Built upon sound principles, and of the best materials, it has far surpassed the expectations of all parties.



OSGOOD & MACNAUGHTON'S STEAM EXCAVATOR AND DUMPING CAR.

PROPOSALS FOR IRON BRIDGE.

On the 20th inst. proposals were received by Chas. E. Fowler, City Engineer of New Haven, for the construction of an iron bridge and abutments over the tracks of the N. Y., N. H. & H. R. R., at the Lamberton street crossing.

SUPERSTRUCTURE.

Corrugated Metal Co., East Berlin, Conn.	$18,300.00
King Iron Bridge & Manfg. Co., Cleveland, O.	17,907.00
Boston Bridge Works, Boston, Mass.	17,890.00
L. W. Dinsmore, Hillsboro Bridge, N. H.	17,648.00
Hudson River Bridge Works, Hudson, N. Y.	16,756.00
Wrought-Iron Bridge Co., Canton, O.	16,300.00
Morse Bridge Co., Youngstown, O.	15,400.00
Wallis Iron Works, Jersey City, N. J.	13,437.00
Penn Bridge Works, Beaver Falls, Penn.	12,848.00

The contract was awarded to the Penn Bridge Works.

SUBSTRUCTURE.

Peter Small, New Haven, Conn.	$18,467.00
Robert Redfield, New Haven, Conn.	15,600.00

The contract awarded to Robert Redfield.

PROPOSALS FOR ORANGE (N. J.) WATER-WORKS.

On August 28 last proposals were opened by the Common Council of the city of Orange, for the following work and materials:

The building of a dam, with flume, 2 gate houses, and all necessary or proper appurtenances; the laying of about 26 miles of pipe; the setting of hydrants and other fixtures; 41,311 cubic yards of embankment; 2,220 cubic yards of rubble masonry; 1,000 cubic yards of ashlar masonry; the clearing of 40 acres of land, together with all necessary excavation and labor therefor.

MATERIALS.

66,520 lineal feet of 4-inch pipe.
42,150 " " 6-inch "
27,375 " " 8-inch "
9,660 " " 10-inch "
7,900 " " 12-inch "
31,680 " " 16-inch "
360 " " 20-inch "
2 20-inch gates, flanged.
6 16-inch " hub.
8 10-inch " " (1 flanged).
15 8-inch " "
25 6-inch " "
60 4-inch " "
200 double nozzle hydrants.
112 gate boxes.

—— special castings, uch as valves, boxes, covers, screws, rods, etc., as the same may be designed and ordered by the Engineer of the city, from time to time.

—— barrels of America Hydraulic cement, of the best quality, freshly ground.

The works will be built on the gravity system, the reservoir being located in a valley between the first and second mountains at a distance of about 6 miles from the city. The water-shed covers an area of about 5 square miles. The reservoir will cover about 60 acres and will be irregular in shape. The dam across its lower extremity will be 875 ft. in length and 40 ft. in height at the center. The mountains form the borders of the remaining sides of the reservoir. All the water carried by a stream flowing between the mountains will be utilized. The average computed supply to be obtained from all sources (rainfall calculated at only 12 in. per annum) will be about 3,000,000 gallons per day, amply sufficient for some time for a place whose present population is 13,000. A pressure of 142 pounds will be obtained at the hydrants, sufficient for fire purposes.

The dam will be built upon a suitable foundation, and there will be three ditches 3 ft. wide and 3 ft. deep under the whole length of the embankment and filled with selected puddle. The dam will be built of cemented masonry, and puddled gravel and clay. The slope of the up-stream side will be 2½ horizontal to 1 vertical, and of the lower side 2 horizontal to 1 vertical. The top of the embankment will be 20 ft. wide. Throughout the entire length of the embankment there will be a wall of first-class cemented rubble masonry. Above the upper slope there will be a rectangular flume and gate-house to receive screens, gates, charcoal, etc. Below there will be a gate-house for the waste water and conduits, gates, etc. From the cross-section drawing, which we herewith present, an accurate idea may be obtained of the plan of the dam, gate-houses and flume.

The flume is rectangular in section, and upon the side at which the water enters will have valves or gates for admitting the supply. These are arranged in a vertical line, in order that the water from the basin may be drawn from any depth below the surface. This arrangement is made necessary by the fact that the depth of the purest water to be obtained from a reservoir at the different seasons of the year varies. Practically the flume will be divided into two sections the entering water will pass through a bed of charcoal to clean it of all sedimentary matters; it will then pass through sponges, as shown in the drawing, before entering the general supply pipe. These sponges will be held in place by a perforated division of copper. These sponges will absorb all animal organisms, and when in combination with the charcoal will purify the water as thoroughly as it is possible for a filter to do. From the flume to the gate-house are two sets of conduits and the connections are so made at the house that the supply pipe can be opened for cleansing purposes without interfering with the water going to the city.

The dimensions and shape of the rubble masonry extending through the embankment are clearly shown in the drawing.

The masonry for the flume and gate-houses will be of ashlar well bonded and grouted and rendered water-tight. The specifications state that all stones used in any part of the masonry must be washed and cleaned of dirt before being laid. Also all heavy pounding and jarring on the wall are to be avoided.

The cement used will be the American hydraulic mixed in the proportion of one cement to two of clean, sharp sand.

The pipes to be of strong, tough gray remelted pig-iron, which will permit of its being readily drilled or cut. Their length not to exceed 12 ft., nor to be less than 11.75, in length, when laid. All pipes and castings to have a groove in the bell ⅜ of an inch wide and $\frac{3}{16}$ of an inch deep, so as to allow room for lead in the joints. The pipes are to weigh as follows, and no deviation of more than 5 per cent. to be allowed:

Per head.		Per length or 11.8 ft.	Per length 12 ft.
100 a.	20-in. pipe, 134 ft.	1,608	1,635
150 b.	16-in. "	1,253	1,274
200 c.	16-in. "	1,360	1,385
200.	16-in. "	1,463	1,487
	12-in. "	944	960
	10-in. "	723	735
	8-in. "	529	535
	6-in. "	361	367
	4-in. "	218	222

The dimensions of rock trenches to be as follows at the bottom:

For 4 and 6 in. pipe, 1½ ft. wide.
For 8 and 10 in. pipe, 2 ft. wide.
For 12 and 15 in. pipe, 2¼ ft. wide.
For 16-in. pipe, 2½ ft. wide.

The hydrants will be so located that each will cover an area of a radius of 250. Gates will be provided so that any portion of the city can be shut off for repairs or other purposes without interfering with the general supply.

The works were designed and are now in charge of William B. Rider, who built the water-works at South Norwalk, Wolcottville, Bethel, Thomaston, Kent and Greenwich, Conn., and at Walton and Oneonta, N. Y., and who is now in charge of the works building at Hornellsville, N. Y.

A committee composed of Horatio Allen, I. S. Cassin and George H. Cook, appointed to consider the proposed plan of William B. Rider, reported that the supply would be adequate for all needs of the city. "The storage reservoir is planned to hold at least 250 million gallons, and a moderate expense may, if ever found necessary, be increased to a capacity of over 300 million gallons. This quantity of itself is sufficient to give the supply now needed for 320 days."

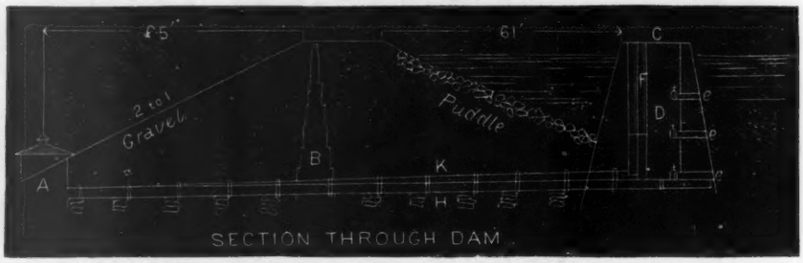
The pressure was considered amply sufficient for fire and domestic purposes.

The plan of Mr. Rider for an auxiliary high pressure reservoir was considered perfectly practicable, and it can at any time be cheaply and effectively constructed.

The quality of the water was deemed unexceptionable.

Upon our visit to Orange, a few days since, we received much valuable information from Mr. Rider, and a tabulated statement of the bids received which we herewith append.

To the kind courtesy of City Clerk of Orange, Mr. Horace Stetson, we are indebted for the following list of contractors with the gross amounts and for the list of the successful bidders.



A = Gate-house.
B = Wall of cemented gravel.
C = Flume.
D = Charcoal filter.
e = Inlet pipes.
F = Sponges.
H = Waste pipe.
K = Conduit pipe.
Rip-rap has a batter of 2½ to 1.

Laying Pipe and Rock Excavation in Trenches.

Geo. H. Titcomb (does not include Rock), 23 Whitehall St., N. Y.	93,331.75
John Satterlee & Co. (does not include Rock), Gloster, N. J.	86,529.90
John Mullen, (Macadam streets 6 cts. extra), Orange, N. J.	74,336.95
Myles Tierney, Jersey City, N. J.	72,039.00
Williams & Hallinan (does not include Rock, nor 16-in. pipe), Chicago, Ill.	69,588.75
John W. Ruthefford, Hoboken, N. J.	67,804.75
John Lockwood & Co. (see bid), New York	67,638.90
J. J. Newman & Co., Providence, R. I.	66,098.10
John E. Halliday, Jersey City, N. J.	65,015.80
John O'Rourke, Orange, N. J.	63,704.10
George B. Inman, New York.	60,899.30
Freel & McNamee, Brooklyn, N. Y.	59,918.60
H. N. P. Dole & Co., Columbus, O.	57,231.50
Francis Leonard & Co. (does not include Rock; Macadam; 10 cts. extra), Norwalk, Ct.	56,406.05
Henry Lewis, Flushing, N. Y.	54,803.25
Frank C. O'Reilly, Orange, N. J.	54,333.55
William H. Weldon, Lamington, N. J., (bid informal).	52,316.25
John M. Weldon, Rahway, N. J., (bid informal).	49,963.40

Dam (exclusive of Timber & Rock excavation).

George H. Titcomb, New York.	84,752.48
J. J. Newman & Co., Providence, R. I.	72,513.15
John Mullen, Orange, N. J.	71,080.32
Fred'k W. Morris, Orange, N. J.	46,658.50
John W. Rutherford, Hoboken, N. J.	46,273.17
Myles Tierney, Jersey City, N. J.	45,678.95
John Satterlee & Co., Gloster, N. J.	45,009.95
John O'Rourke, Orange, N, J.	43,873.14
George B. Inman, New York.	41,257.40

BIDS FOR MATERIALS AND WORK ON THE ORANGE (N. J.) WATER-WORKS.

NAME OF CONTRACTOR.	RESIDENCE.	Cast-iron pipe, ton of 2,240 lbs.	Specials per lb.	HYDRANTS. With case. 6-inch	HYDRANTS. With case. 4-inch	HYDRANTS. Without. 6 inch	HYDRANTS. Without. 4-inch	GATES. 20-inch flange	GATES. 16-inch	GATES. 12-inch	GATES. 10-inch	GATES. 8-inch	GATES. 6-inch	GATES. 4-inch	PIPE LAYING. 20-inch	PIPE LAYING. 16-inch	PIPE LAYING. 12-inch	PIPE LAYING. 10-inch	PIPE LAYING. 8-inch	PIPE LAYING. 6-inch	PIPE LAYING. 4-inch	EXCAVATIONS. Rock	EXCAVATIONS. Earth	Puddle and dry embankment	MASONRY, PER CU. YD. Rubble	MASONRY, PER CU. YD. Ashlar	Clearing, per acre	Gate Boxes, each	Paving per yard	Timber per M	Wrought Iron	Cement per bbl.
		$	Cts.	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	Cts.	$	$	$	$	$	$	Cts.	$
Treman, Waterman & Co.	Ithaca					33.00	25.00								.90	.80	.50	.40	.35	.25	.20	3.00	3.00	.35			35.00		.50	48.00		
John W. Rutherford	Hoboken														.80	.70	.50	.31	.28	.23	.20	5.00	5.00	.30			50.00		.30	30.00		
Freel & McNamee	Brooklyn														Hydrants and Gates to be Chapman Patent.																	
Richard Pancoast	Orange	37.50	3½	49.60	32.65	44.10	28.95	175.00	89.50	52.00	40.00	27.25	18.56	12.17																		
Ludlow Mfg. Co.	Troy, N. Y.			47.50	32.25	42.00	28.00	120.00	80.00	50.00	38.25	26.90	18.50	11.25																		
Geo. B. Inman	New York City	39.50	3½	46.00	35.00										1.00	.60	.47	.36	.30	.26	.21	4.00	1.00	.40	5.00	9.00	90.00	10.00	.75	30.00	.10	1.40
A. H. McNeal	Burlington, N. J.							450.00	300.00	120.00	94.00	75.00	68.00	45.00	1.35	.95	.68	.60	.45	.38	.35	4.00	1.55	.38	15.00	19.50	50.00	12.00	3.75	65.00	.12	1.75
Geo. H. Titcomb	New York City	35.50		85.00	70.00			for 20-in., 16-in., and 12-in.; $36.20 for 10-in., and 8-in.; $37.25 for 6-in. and 4-in.																										
Warren Fdy & Mach. Co.	New York City														.67	.69	.44	.38	.32	.26	.23	2.50	.90	.45	4.75	15.00	50.00		1.00	40.00		
J. R. Halladay	Jersey City							Setting hydrants $500 each; setting gate boxes free if measured in pipe.							.90	.70	.50	.40	.40	.30	.25	5.00	.50	.50	6.00	17.00			.75			
Miles Tierney	Jersey City																								6.00	12.00	60.00	6.00	2.00	15.00		
F. W. Harris	Orange			46.00	35.00			125.00	95.00	55.00	43.00	30.00	20.00	13.50	2.00	2.05	1.80	1.42	1.10	.83	.65	3.00	.25	.25				5.00				
McRitchie & Nichol	Chicago							For all gates (Eddy make), and Bailey hydrants $8,830.35.																								
Theo. Macknet & Co.	Newark			50.00	37.50			115.00	80.00	45.00	39.75	32.75	19.25	13.00	1.05	.96	.97	.83	.81	.27	.24	1.60	.40	.40	9.00	30.00	45.00		.85			
New York City							For Macadam streets 6c. per lineal foot extra.								.58	.48	.40	.34	.29	.24	.21	1.40	.40	.40	4.85	8.00	30.00	6.00	.94	40.00		
Julius Jonson & Co.	Orange	38.00		72.80	46.00	35.00		125.00	95.00	55.00	43.00	30.00	20.00	12.50													49.50					
John Mullen	R. D. Wood & Co., Phila														.75	.60	.50	.42	.34	.28	.22	2.95	.35	.42	4.40	14.00	97.50		10.00				
F. C. O'Reilly	Orange														.38	.34	.33	.31½	.30	.26	.22	2.95	.35	.39	4.10	8.80	95.00		2.00	30.00		
Florence Iron Works	Orange														1.50½	.58	.45	.37	.25	.23	.20	3.00	.39	.37	4.10	8.80	25.00					
John Watchman	Orange														.60	.50	.40	.25	.25	.25	.25	3.00	.40	.45	6.95	8.95	30.00		2.00	30.00		
John O'Rourke	Orange														.75	.60	.57	.51	.46	.42	.39	3.00	.35	.45	6.95	8.95	30.00		1.50	60.00		
John M. Weldon	Rahway														.75	.65	.45	.35	.28	.23	.20	3.00	.25	.45	6.95	8.95	30.00		1.50	60.00		
Williams & Hallinan*	Chicago														.80	.60	.43	.38	.32	.29	.23	3.00	.35	.65	7.00	25.00	100.00		1.50	50.00		
Wm. H. Weldon	Lamington, N. J.														.80	.60	.43	.38	.32	.29	.23	3.00	.35	.65	7.00	25.00	100.00		1.50	50.00		
John Satterlee	Gloster, N. J.														1.00	.45	.33	.33	.25	.21	.19	2.50	.45	.45								
H. N. P. Dole & Co.	Columbus, O.																															
J. J. Newman & Co.	Providence, R. I.							All pipes in Macadam streets 6c. per ft. extra, except 4 in. which is 7c. extra.																								
Henry Lewis	Flushing, L. I.							150.00	98.00	51.00	37.00	24.00	16.00	11.00																		
Hutchinson & Alexander	Allegheny, Pa.					43.00	26.00	144.00	89.00	48.00	36.00	27.00	18.50	11.25																		
Eddy Valve Co.	Waterford, N. Y.	35.50		For all 12-in., 10-in. and 8-in.																												
R. A. Brick	New York City	36.00	65.00	6-in. and 4-in.				180.00	112.00	59.00	48.00	30.00	22.00	13.00																		
do.	do.																															
Boston Machine Co.	Boston			50.00	36.00																											
Tamaqua Iron Works	Tamaqua, Pa.					29.00	27.50								.75	.55	.43	.36	.29	.23	.20	3.00	.35	.39	4.10	8.80	25.00		2.00	30.00		
John Lockwood & Co.	New York City																															
I. S. Cassin & Co.	Philadelphia			69.44	42.00	34.30		168.75	80.30	43.80	35.22	24.04	17.00	10.95	.75	.55	.43	.36	.29	.23	.20	3.00	.35	.39	4.10	8.95	30.00		1.50	60.00		
F. Leonard	Norwalk, Conn.							for all Macadam streets 10c. per ft. extra							.65	.55	.42	.33	.25	.23	.20	3.00	.35	.39	4.10	8.95	30.00		1.50	60.00		
Burnett & Teed	Orange			Offer to clean ground and have the wood for $1,300; all wood removed to cost $1.50 per cord; brush burnt on ground; work done as per specifications.											.65	.55	.42	.33	.25	.23	.20	3.00	.35	.39	4.10	8.95	30.00		1.50	60.00		

* 20-in. pipe, 50-ft. head, $92.25; 16-in. pipe, 100-ft. head, $58.60; 16-in. pipe, 150-ft. head, $54.00; 16-in. pipe, 200-ft. head, $48.00; 16-in. pipe, 50-ft. head, 59.60; special castings, $60.00; 12-in. pipe, $50.10; 10-in. pipe, 51.04; 8-in. pipe, $54.07; 6-in. pipe, $55.85; 4-in. pipe, $65.86 per ton of 2,240 lbs.

Frank C. O'Reilly, Orange, N. J..... 39,267.43
Francis Leonard & Co., Norwalk, Ct., (don't include clearing land)..... 35,907.23
Williams & Hallanan, Chicago, Ill..... 34,685.07
Freel & McNamee, Brooklyn, N. Y..... 33,391.50

Puddle-Bank.

John Mullin, Orange, N. J..... 0.85

Setting Hydrants.

John E. Halliday, Jersey City, N. J. (each)..... 5.00

Clearing Land.

Burnett & Teed, besides wood..... 1,300.00

Timber, per M.

Geo. H. Titcomb..... 70.00
John Satterlee & Co..... 60.00
J. J. Newman & Co..... 50.00
John Rutherford & Co..... 48.00
Myles Tierney..... 40.00
Francis C. O'Reilly..... 40.00
Freel & McNamee..... 30.00
Williams & Hallinan..... 30.00
George B. Inman..... 20.00
Francis Leonard & Co..... 18.00
McRitchie & Nichol..... 15.00

Rock Excavation at Dam.

George B. Inman..... $4.00
John W. Rutherford..... 3.00
Freel & McNamee..... 3.00
Myles Tierney..... 3.00
Williams & Hallinan..... 3.00
J. J. Newman & Co..... 2.00
John O'Rourke..... 1.87½
John Mullen..... 1.60
George H. Titcomb..... 1.55
Francis C. O'Reilly..... 1.40

Pipe and Special Castings.

George B. Inman, N. Y..... 158,254.44
A. H. McNeal, Burlington, N. J..... 158,254.44
Florence Iron Works, Florence, N. J.... 152,602.27
Richard Pancoast, Orange, N. J..... 150,473.69
Warren Foundry Machine Co., Phillipsburgh, N. J..... 145,123.88
R. A. Brick, New York (don't include 20 in. and 16 in. pipe)..... 75,176.82
Williams & Hallinan, Chicago, Ill. (bid informal)..... .....

Gates.

George H. Titcomb, New York..... 8,998.00
Theo. Macknet & Co., Newark, N. J..... 8,926.35
Boston Machine Co., Boston, Mass..... 3,264.00
McRitchie & Nichol, Chicago, Ill..... 2,933.00
Florence Iron Works, Florence, N. J.... 2,933.00
Richard Pancoast, Orange, N. J..... 2,880.85
Julius Jonson & Co., New York..... 2,832.00
George B. Inman, New York..... 2,750.00
Eddy Valve Co,, Waterford, N. Y..... 2,712.50
Ludlow Valve M'f'g Co., Troy, N. Y..... 2,884.00
Hutchinson & Alexander, Alleghany, Pa. 2,669.00
I. S. Cassin & Co., Philadelphia, Pa..... 2,602.22

Hydrants, with Frost Cases.

Julius Jonson & Co., New York..... $7,625.00
Boston Machine Co., Boston, Mass..... 7,340.00
I. S. Cassin & Co., Philadelphia, Pa..... 6,918.00
Richard Pancoast, Orange, N. J..... 6,728.00
Hutchinson & Alexander, Alleghany, Pa. 6,655.00
Ludlow Valve Mfg. Co., Troy, N. Y..... 6,602.50
Tamaqua Mfg. Co., Tamaqua, Pa..... 5,515.00
Eddy Valve Co., Waterford, N. Y..... 5,370.00
Treman, Waterman & Co., Ithaca, N. Y. 5,083.00

Matthew's Patent.

George H. Titcomb, New York..... $14,150.00
George B. Inman, New York..... 7,110.00
McRitchie & Nichol, Chicago, Ills..... 7,110.00
Florence Iron Works, Florence, N. J.... 7,110.00

On September 11th contracts were awarded as follows:

To Francis C. O'Reilly, of Orange, N. J., for pipe laying and rock excavation in the trenches.

To Freel & McNamee, of Brooklyn, N. Y., for building the dam and clearing the land therefor.

To "The Warren Foundry and Machine Co." of Phillipsburgh, N. J., for pipes and special castings.

To I. S. Cassin & Co., of Philadelphia, Pa., for gates; and

To "The Florence Iron Works," of Florence, N. J., for hydrants.

And all the contracts have been duly executed.

ENGINEERING NEWS
AND
AMERICAN CONTRACT JOURNAL.
Tribune Building, New York City.

GEO. H. FROST.....EDITOR AND PROPRIETOR.
S. D. V. BURR.....ASSOCIATE EDITOR.

SATURDAY, SEPTEMBER 23, 1882.

EDITORIAL ANNOUNCEMENTS.

Terms of Subscription.—To the United States and Canada, $4 per annum, including postage; all parts of Europe, $5, payable in advance. Remittances at the risk of the subscriber, unless made by registered letter or by draft, check or P. O. order, payable to GEO. H. FROST.

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Articles for Publication in the current number should be received at the office of publication not later than Thursday morning, and advertisements not later than Friday noon.

Correspondence upon subjects which naturally belongs to the province of this journal is solicited.

CONTENTS.

	PAGE		PAGE
Steam Excavator and Dumping Car (*Illustrated*)	331	New York, Ontario & Western and New York, West Shore & Buffalo Railways Working Force	336
Proposals for Iron Bridge	332	American Society of Civil Engineers	336
Proposals for Orange, N.J., Water-Works	332	The History and Statistics of American Water-Works	336
EDITORIAL DEPARTMENT:		A Valuable Book of Reference	336
The Iron Manufacturers and the Strike	334	CORRESPONDENCE:	
Increasing the Water Supply of Brooklyn, N. Y.	334	City Improvements and Malaria	336
Personal	335	Safety in Railway Travel	337
Ontario (Can.) News	335	Cost of a Bombardment	337
The Field Building	335	The Growth of the United States	337
Recent Inventions Patented During the Present Week	335	Notes	337
		A Train Telescoped	338
		General Intelligence	338

THE IRON MANUFACTURERS AND THE STRIKE.

The ironworkers' strike has terminated in favor of the manufacturers after a fruitless effort continued through almost three months. The only element of uncertainty from the beginning was the determination of the mill-owners, or rather lack of determination. Heretofore, all strikes in rolling mills were successful, because the owners, one after the other, gave in, and their chief excuse or justification was that they had to protect their trade. This time a federation was formed of the iron and steel manufacturers of the United States, not only in view of the then present emergency, but for all future emergencies of like character, the condition or basis of which was that when any manufacturer or firm was obliged to resist a demand for an advance of wages, the federation, divided into districts, should pay each a certain sum per day or week for each idle furnace. This action provided the missing link. The plan was put into action early last June, and has been attended with signal success. It drew all manufacturers together, and assured each that no advantages would or could be taken of any. Another fact which enabled the manufacturers to resist the strikers so successfully was, that the demand for iron and steel has been gradually declining since the opening of the year, a result indicated by the declining activity in railroad building, which began with the opening of the present year. Railroad builders curtailed requirements, and railroad managers curtailed demands for equipments, rolling stock and motive power. This was early reflected in a limitation of orders for smaller material. Bar mills, plate and sheet mills and furnaces, booked fewer orders, and for smaller amounts. Manufacturers saw the indications of restricted demand and became apprehensive. Capacity for the production of every kind of iron had been expanded, and was being expanded. Prices began to sink in March; April and May sent them lower. A partial suspension was inevitable, unless some new influence was exerted. The ironworkers, who for two years had been adding to their numbers, and extending branches of their organization wherever they found it possible, resolved to use the power of which they felt themselves possessed, and presented demands to the mill-owners for $6 per ton for boiling iron instead of $5.50. The other branches of skilled labor presented their demands also, as part of the one request. The manufacturers refused as they were obliged to, and an hundred mills were idled on June 1st. They knew from experience that the strike would be a long one, but they knew what the workmen did not—that the market requirements would allow them room to resist. Had they not federated the result might have been different. Concessions on the part of a few weaker manufacturers would have encouraged the strikers, and increased the fears of the manufacturers themselves, who are ready to make sacrifices to protect their trade.

The one hundred and twenty suspension days which will be completed on this Saturday have been of immense advantage to the manufacturers. It has cleared all old stocks of iron out of the market. Consumers have used up everything, and have been ordering supplies for current wants with great caution. Hence business opens next Monday, in all markets from Boston to St. Louis with no iron on hand, and order books crowded with orders. Numerous requirements were withheld during the summer, and these will increase the volume of business to be disposed of during the last quarter of the year. The price of iron and steel for the next twelve months can be known with almost absolute certainty. The volume of business will regain normal limits, and the trade will derive substantial advantages by the strike. Restriction has been enforced in other industrial departments. The production of coal was restricted by the action of mine owners in Eastern Pennsylvania, resulting in an enhancement of value.

While these agencies were working out desired results and conditions, other agencies were at work to lay the foundations for greater industrial activity. The crops are large. Traffic has begun to swell to enormous proportions. Railroad earnings are increasing and dividends are encouraging. Inquiries for railway materials are coming in, and the evidences of a greater general demand, while not numerous, are much more gratifying than six months ago. The conditions are favorable for an increase of activity in the iron industry. The mileage for this year is over seven thousand miles, much in excess of same time last year, and new enterprises are being heralded to the public almost weekly. Several elements of uncertainty still exist, and investors have been taught lessons of prudence, which they will not forget, even in the present period when there is so much to encourage.

Apart from accidental causes, such as the recent strike, the tendency of years is downward. That tendency has been temporarily checked by the strike and by the firmness developed in the British iron market, and which continues up to the present hour. The probabilities are that prices will be firm for a few months, but in time the gradual accumulation of products will produce the downward tendency which results from a rapid increase in the iron-making capacity.

Railroad building has been prosecuted with regularity all summer, and is still going forward rapidly. Mills have orders enough to keep them busy half through the winter. Large orders of late have been exceptional. Quotations are $45 for large lots, winter delivery, which, it is stated in some quarters can be shaded when the buyers are ready. The Convention of Manufacturers at Cresson have anticipated the probable action of Congress in recommending to the Tariff Commission a reduction in duties from $28 to $22.40 per ton. Domestic rail makers will probably be able to take care of their interests in any event. The occasion of complaint against steel rail makers, on the score of enormous profits, disappeared since prices of rails declined from $80 per ton to $45. In a short time the productive capacity will be over two million tons per annum.

The abundant harvests will help to reduce cost of production, cost of living and rate of wages, and in this may increase the protection from foreign products already enjoyed. In fact, there are agencies at work which in time will place the American manufacturers in a better position to control the domestic markets without artificial assistance, which must always be a bone of contention as to amount and method of conferring it.

INCREASING THE WATER SUPPLY OF BROOKLYN, N. Y.

Brooklyn, for the past two or three years, has had but two alternatives to choose from to settle the water-supply problem—to increase the supply or decrease the daily rate of consumption. In the report of the chief engineer, Robert Van Buren, for the year 1881, we find a recommendation for the construction of a well similar to those built on the water-shed between East New York and Jamaica. It was proposed to construct galleries running east and west from this well. This water-shed contains about eight square miles, and if the supply obtained should warrant it, it was advised to extend these galleries so as to intercept all water flowing to the ocean from this shed. From this source 3,000,000 gallons could be positively obtained, and perhaps 5,000,000. If to do this cost $200,000, the annual interest on which would be $10,000, and the cost of maintenance and pumping was $6,000, the annual cost would be $16,000. The report states that to go east of Freeport, where the first stream of any importance is found, would cost $1,000,000, and the supply secured would be 5,000,000 gallons daily. The annual interest would be $50,000. This gives a saving in favor of the well system of over $30,000 per annum.

In accordance with these views, plans were advertised for, and the result was five bids received. The specifications stated that the party bidding must establish the feasibility of his plans, by reference to works built by him, or by conclusive proofs. All the propositions were to give a full description of the work, together with the necessary pumping capacity, engine-house, chimney, connections, foundations, land required, etc. A duplicate engine, as a reserve pumping capacity, was provided for at each station. The location, plan of wells, engines, etc., to be shown in detail on such scale and dimensions as to enable the chief engineer to judge of the entire system. The location must be near the line of the city conduit, and between certain points. Bids to state the price of the entire work, and time required to build. After completion the pumping will commence and continue uninterruptedly for one year. The permanent supply will be determined from the minimum yield during that time. The department will take charge of the works during that time, pay all expenses, and upon their successful operation will depend their final acceptance by the city. The contractor to supply all necessary mechanical apparatus for keeping a perfect record. Bidders were required to state the average daily supply they may be willing to guarantee, but this will not be accepted until after the year's test. If the supply should fall below the guaranteed amount, it will be optional with the Commissioner of City Works to reject the works, or accept them at such a reduction in price as the ratio of the total cost bears to the reduced supply obtained by them. Fifty per cent. of the contract price will be retained until the works are accepted by the Commissioner. Bonds required for the faithful performance of the work.

The following bids were received:

A. J. L. Loretz, 10,000,000 gallons for	$430,000
D. H. Valentine, 3,000,000 gallons for	170,000
Freel & McNamee, 4,000,000 gallons for	185,000
Thomas Newman, 3,000,000 gallons for	125,000
Andrews & Co., 5,000,000 gallons for	180,000

The cost per million gallons would be:

A. J. L. Loretz	$43,000.00
D. H. Valentine	56,666.67
Freel & McNamee	46,250.00
Thomas Newman	41,666.67
Andrews & Co.	36,000.00

To receive the requisite amount of water the plan proposed by Mr. Loretz contemplates three compound wells, each 50 ft. and 20 ft. in diameter,

and 50 ft. and 30 ft deep. These three wells to be connected by galleries extending east and west at a depth of 20 ft. The pumping station to be at the middle well. The plan is an expensive one, although probably the best for a well and gallery system. The galleries would run 1,200 ft. each way from the wells.

Mr. Valentine also proposed to construct three wells, 50 ft. inside diameter, with galleries running from each well at right angles to the direction of flow. Wells to be placed in the valley of the watershed. To have a depth of water below the spring level of 16 ft.; the galleries to be 6 ft. wide and 16 ft. deep.

Messrs. Freel & McNamee also proposed three wells, 30 ft. in diameter, a depth of water of 17 ft., and located within 400 ft. of the conduit line. On each side of the wells, and at a distance of about 2,000 ft., they would place small wells 8 ft. in diameter, giving a water depth of 15 ft. An 8-in. pipe would connect these wells to the engine at the central well.

Mr. Newman proposed wells and stations similar to those now at Springfield and Watt's Pond.

Messrs. Andrews & Company—whose proposal was accepted—proposed a system of driven wells. The wells are patent air tight, filtrating, tube wells, operated under the Shaw gang-well patent. The gangs to be located near the conduit, and to have two or three pumping stations to secure the 5,000,000 gallons guaranteed.

The total cost of the work will be as follows:

Contract for the complete work	$180,000
Land damages, estimated	8,000
Engineering, inspection, etc	5,000
Running the pumping stations one year, engineemen, firemen, coal, etc	12,000
Contingencies, 5 per cent	10,250
Total	$215,250

PERSONAL.

GENERAL ROSSER has been appointed chief engineer of the Hudson Bay Railway Company.

A dispatch from Cleveland, dated Sept. 18, says: The resignation of SAMUEL BRIGGS as superintendent of the Valley road has been accepted, and J. E. TURK, late chief engineer of the Valley road, has been given his place. BRIGGS goes to the Connotton narrow-gauge road, a rival line, as general manager, in place of WILLIAM W. HUNGERFORD.

ONTARIO (CAN.) NEWS.

The work on the aqueduct at Welland is progressing most favorably, and the coffer-dam inclosure will be unwatered by the middle of October at latest. This important link in the Welland Canal attracts great attention, for as soon as the aqueduct is finished the deepening of this great water-course is completed for vessels of fourteen feet draught. Great care has been taken by the contractors, Messrs. Beemer & Sullivan, and much credit is due to their engineer, Mr. J. Vincent Browne, for the manner in which the coffer-damming has progressed; having to contend against 23 ft. of water great caution was necessary. We hope to be able soon to give our readers a more detailed account of this important engineering work.

We gave a brief notice in a previous issue of the Murray Canal. This work will attract much attention for the next two or three years, and, as the work is in the hands of so efficient a manager as Mr. J. D. Silcox, we can insure a perfect success. The firm name is J. D. Silcox & Co. Mr. Silcox is a young man, and came into Canada but five years ago as manager for the firm of Vandusen & Co., of Syracuse, and, certainly, from the strides made, he is bound to rank among the first in the army of contractors. The amount of his present contract is $750,000.

The dry dock at Collingwood is progressing favorably and will, in all probability, be finished before winter sets in.

Section 34 of the Welland Canal was awarded to Charles Dunbar, of Buffalo. Most of the work to be done is rock. This section was taken over from McNamee & Co. by the government, as the contractors could not finish it. The people of Welland are now looking forward to the commencement of the water-course for mill privileges, for which the government has granted $26,000. Many hungry contractors will be on hand for the job.—*Communicated.*

THE FIELD BUILDING.

One by one, gradually but surely, the old edifices of this city that have stood as landmarks for the past fifty or one hundred years are being removed and in their stead are reared buildings more in keeping with the advance and demand of the present time. The most recent case of this description is the removal of the Washington House at the foot of Broadway and on the corner of Battery place, to make room for what might most aptly be termed a business palace. When Battery Park was the evening promenade of the "best" society of New York, and when the residences in the immediate vicinity were occupied by the foremost men of the city, the Washington House loomed up and was at the height of its glory. As the resident portion of the town moved up, being displaced by the demands of business, this house was occupied as offices.

The building which is now being erected on this site by the Washington Building Company, composed of Cyrus W. Field, his son, son-in-law and other well-known capitalists, will be bounded by Broadway, Battery place and Greenwich st., having a facing on Battery place of 175 ft. and a depth of 100 ft. The style of architecture, situation—commanding an unrivaled view of the entire harbor—and the massiveness of its proportions will combine to render it one of the most imposing structures in the lower part of the city; while its interior arrangements, having but one end in view—the convenience and pleasure of its prospective occupants—will contain all the appliances in modern building conducive to comfort and health. The architect has paid particular attention to the sanitary problems connected with the building, and we have no hesitancy in predicting a total absence of all noxious gases commonly designated "sewer gas," which are constant visitors in some of our prominent office buildings and which not only offend the olfactories, but are prejudicial to health.

The building will be eleven stories high and will be 155 ft. from the sidewalk to the top of the main roof, which will be surmounted by a cupola on the center of the Battery place front. This cupola will be 240 ft. high and will be furnished with a promenade from which the surrounding country can be viewed. The famous "four windows" of Trinity Church will be henceforth ranked as second in point of height to which visitors can ascend.

The fronts will be of Philadelphia brick with trimmings of carved Belleville stone, the two forming a contrast most pleasing to the eye. On the corner oriel windows will be carried all the way up.

The foundations have been carried down to bedrock in order to insure perfect stability and prevent all possibility of settling. In some places this required an excavation of from 40 to 45 ft. The cost of the foundation wall to a height equal to the sidewalk has been about $100,000.

The main entrance to the building will be at the center of the Battery place side; there will also be one on Broadway and one on Greenwich street with a corridor extending through and connecting the two. The main office on this floor will occupy the entire front, its dimensions being 41 by 160 ft. In the oriel at the corner will be a private door for this apartment. The other rooms will be 40 by 40 ft. and 47 by 36 ft.

The second and third floors will be divided into 30 offices each; the upper stories will be divided into 34 rooms each. This will give a total of 230 offices on the floors above the first. The subdividing of these rooms is not arbitrary but will be arranged to suit the wants of the occupants.

Every precaution has been taken to make the building fireproof. All the iron work will be covered with a fireproof casing; the iron columns will be covered with a layer of Keene's cement, about 1½ in. thick. As a protection against fire from the outside all the jambs and casings of the windows will be covered with a layer of Keene's cement, thus leaving only the frames and sashes of wood. The staircases will be of stone and iron.

There will be five elevators in the building, located in different parts so as to afford quick means of reaching any particular section.

An open fireplace will be built in each office. Heat will be obtained from boilers in the cellar. Wires for electric light and other purposes will be put in at the time of building. The interior will be finished throughout in hard woods.

The *Mail and Express* will have its editorial and composing rooms in the upper floor and its presses in the basement.

One most novel feature in the building is the ornamentation found in the plans for the open court. This is a most agreeable departure from the conventional rules which condemn rear tenements to feast their gaze upon rough walls covered with an annual coat of whitewash.

According to the estimates, the building will cost about $1,000,000.

The architect of the building is Mr. Ed. H. Kendall, of 71 and 73 Broadway. Some of the most imposing buildings in this city have been erected after the plans of Mr. Kendall—the Equitable on Broadway; the German Savings Bank, corner of Fourteenth st. and Fourth ave., and (now in process of construction) the mansion of Messrs. Robt. and Ogden Goelet, on Fifth ave. The design for the exterior of the present building might be not inappropriately termed "free classic." The details will be of the colonial school in which the old Washington House was built.

THE CONTRACTS.

The contracts have all been let with the exception of the two upper stories, and the carpenter work, plumbing and steam-fitting and apparatus.

W. H. Hazard & Sons have the contract for the foundations. The remainder of the mason work is by Bernard Spalding. J. B. & J. M. Cornell have the contract for the iron work. Brown & Co. are doing the cut-stone work. The New York Stone and Fireproofing Company are doing all the fireproofing. T. B. Galligan & Co. have the contract for the sheet-piling required and the blasting.

At the time of the letting of the contracts the rates of wages and prices of materials were so high that it was deemed advisable to postpone the lettings for the two upper stories to some future time, when it is expected much more advantageous terms can be obtained.

RECENT INVENTIONS PATENTED DURING THE PRESENT WEEK.

BRIDGE.

In this novel improvement blocks of rigid material are threaded upon cables, the latter being put in such tension within the blocks and against the ends of the series as to make a substantially rigid beam. Truss members are also combined therewith.

RAILWAY DITCHING MACHINE.

A late invention describes a device consisting of a railway truck, which bears derricks with tackle adjustably supporting angular carriers with like plows and belts running on two series of rollers communicating by an oblique rod and bevel gears, and inclined to each other, and having a central joint belt and low, spring-fastened inside boards. The carriers have supporting-rods, adjustable by rack-bar and pinion, screw rods and hinged joints. Transverse carriers conduct the material to an endless conveyer formed of beveled overlapping slats joined by central and end links, and having hangers with rollers which run on trackways in suitable cars. The conveyor is driven by rag wheels in the end car engaging with the hangers. Independent engines operate the several belts.

ELEVATED CABLE-RAILWAY.

In an elevated cable railway the car is suspended near the street surface by rods connected with the track above. This track has flangeless wheels, which are kept upon a smooth surface rail by guard-wheels running horizontally in immediate proximity to the wheels and against the inner face of the wheel.

UTILIZING EXHAUST STEAM.

This improved process consists essentially of a forced hot-water jet united with dry or super-

heated steam, said steam and water being taken from one common source, and with the said exhaust forced into the water-body of the same boiler from which they were taken.

INCANDESCENT ELECTRIC LAMP.

A late English invention consists in the manufacture of the glass enclosures for incandescent lamps, comprising the preparation of the vessel to receive the wire by, when the glass is hot, deflecting inward a portion, then detaching the said portion, and, after fixing the wires, again completing the vessel by sealing the detached portion.

STEAM-TRAP.

This novel steam-trap is provided with a movable tank attached to the float, arranged and constructed so as to alternately receive and discharge water, and by its consequent change of weight render the movements of the float more positive.

SUPPORT FOR ELECTRIC LIGHTS AND CONDUCTORS.

The spindle of a stationary lamp-post is used in connection with a tubular extension fitted to and extending above the same. Means are provided for adjusting the upward direction of the tubular extension. F. B. BROCK.

WASHINGTON, D. C.

NEW YORK, ONTARIO & WESTERN AND NEW YORK, WEST SHORE & BUFFALO RAILWAYS' WORKING FORCE.

WEEHAWKEN TO MIDDLETOWN.—CORNWALL TO SYRACUSE.

19,337 men...	19,337
110 steam and compressed air drills, equal to	1,320
19 steam excavators	1,900
4 dredging machines	1,600
	24,157

3,699 horses and carts; 28 locomotives; 1,252 cars; 20 pile drivers; 69 steam derricks; 9 steam pumps; 27 tugs, scows and canal boats.

(Signed.) WALTER KATTÉ, Chief Engineer.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

A meeting of the Society was held at its house, in 23d street, New York, at 8 P. M., Wednesday, Sept. 20, 1882, Vice-President Wm. H. Paine in the chair. A paper describing the methods used in a rapid topographical survey of a portion of the gold field of Nova Scotia, by Wm. Bell Dawson, was read, in the absence of the author, by the Secretary. This survey was made by the use of stadia hairs and a Rochon micrometer telescope for the measurement of distances, and resulted successfully and with very moderate expense. Col. Wm. H. Paine, Vice-President of the society, described the methods in use by him in making surveys for the campaign maps of the Army of the Potomac during the war, observations often being taken from the tops of trees, and the resulting maps showing remarkable accuracy. Mr. Robert B. Stanton, M. Am. Soc. C. E. of the U. P. R. R., described rapid surveys made by Mr. Blickensderfer and himself in preliminary reconnoissances for the Pacific Railways.

THE HISTORY AND STATISTICS OF AMERICAN WATER-WORKS.

BY J. JAMES R. CROES, M. AM. SOC. C. E.

(*Continued from page* 328.)

CCCLXXXI.—LEE, MASS.

Lee, Massachusetts, in lat. 42° 30' N., long. 73° W., is in a very broken and rolling country on the Housatonic River.

Settled in 1760, it was incorporated as a town in 1776.

Water-works were built by a private company in 1881, taking the supply from a stream, which has 6 square miles water-shed, on which an impounding reservoir, holding 20,000,000 gallons, is formed. The water is conducted by cement-lined wrought-iron pipe to a distributing reservoir, holding 1,500,000 gallons, at 212 ft. above the village.

Distribution is by 4½ miles of cement-lined wrought-iron pipe of 10 in. to 1 in. diameter, with 4 fire hydrants, 17 gates and 30 taps.

Wrought-iron and cement-lined service pipes are used.

The population in 1880 was 5,000. The daily consumption is not determined yet.

The capital stock of the company is $30,000.

M. H. Pease is Treasurer.

CCCLXXXII.—NORTH ADAMS.

North Adams, Massachusetts, in lat. 42° 42 N., long. 73° 8' W., is in a hilly country and on the Hoosac River.

Water-works were built by the town in 1865, taking the supply from a mountain brook. The water is collected in a reservoir holding 100,000 gallons, from which it passes to a subsiding reservoir containing 10,000,000 gallons, and is then conveyed to a distributing reservoir holding 750,000 gallons at 250 ft. above the town.

Distribution is by 18 miles of cast-iron pipe with 110 fire hydrants. The number of taps is not given, nor the consumption. The supply is hardly equal to the demand, and in 1879 it was necessary to limit the consumption during the dryest season. The population in 1880 was 10,192.

The works have cost $180,000. No further financial statements are given.

The works are controlled by the Prudential Committee of the fire district. Thomas A. Hodge is the Superintendent.

TO BE CONTINUED.

The receipt of statistics as follows is acknowledged with thanks: From M. H. Pease, Treasurer, statistics and water rates of the water-works of Lee, Mass. From S. W. Brayton, statistics of the water-works of North Adams, Mass. From J. H. Peabody, statistics of the water-works of Cañon City, Col.

A VALUABLE BOOK OF REFERENCE.

A gentleman had a longing to "ride a hobby," and so he started a paper, which is a "hobby" that is usually considered expensive to ride. This gentleman was, and is, an enthusiast, as all men who accomplish much are, and his interest in, and love for, his pet journal grows with its growth. The outcome of money lavishly spent in subsidizing the ablest writers on sanitary matters, in collecting opinions that cannot be refuted, and in every way endeavoring to build up an authoritative journal on sanitary subjects, is *The Sanitary Engineer*, now in its sixth volume, which commenced June 1st. In quality of paper, beauty of typography, and value of its matter, this journal is a decided success. Personally, we do not admire its make-up, as it obliges the advertisements to be bound up with the reading pages. But that concerns only the proprietor and his patrons. We have the *fifth volume* before us. It comprises the 26 numbers from Dec. 1st last to May 25th, and forms a book of 552 pages, in substantial and neat binding. It contains

Reviews, comments, and criticisms by experts on events of special interest to sanitarians, health officers, analysts, architects, civil and sanitary engineers, gas engineers, electricians, plumbers, gas fitters, hot-water engineers, steam fitters, builders, pharmacists, and manufacturers of food products.

The answers, with illustrations, to a great variety of practical questions relating to plumbing, drainage, sewerage, steam fitting, hot-water circulation, the fitting up of hot-water boilers, and water supply, make it invaluable to the mechanic and professional man.

A complete record of all United States patents for fixtures and appliances used in plumbing, sewerage, gas fitting, gas manufacture, steam and hot-water heating, ventilation, and electric lighting, makes it valuable to Inventors and Manufacturers.

The following are a few of the many articles of permanent interest:

A review of Town Sewering in England, with opinions on the question of Small versus Large Sewers, or the Combined versus the Separate Systems, by Robert Rawlinson, C.B., Chief Engineer, Inspector Local Government Board, England.

A Report on the Sewerage of Concord, by Edw. S. Philbrick, C.E. Instructive to town authorities generally.

Remarks by John S. Billings, Surgeon U. S. Army, before the Academy of Medicine, New York, on Sewer Gas and the value of Modern Methods for excluding it from Houses. This article throws considerable light on a question generally misunderstood.

Electric Lighting: Its Fire Risks and their Remedies. Two articles by Prof. Henry Morton, President Stevens' Institute of Technology, Hoboken, New Jersey.

Illustrations, with description of the Arrangements for Heating and Ventilating the Bridgeport School-House (intended to be a model building).

A continuation of Dr. J. S. Billings' Letters to a Young Architect on Ventilation and Heating, with illustrations of notable buildings.

A continuation of the "Sanitas" articles on Plumbing Practice (illustrated). Interesting to architects, builders and plumbers.

A criticism of Plans to Ventilate House Drains by Gas Jets, in connection with attempts made by a Mr. Mineard in London (illustrated).

Steam Fitting and Steam Heating, by "Thermus," a series of practical articles (illustrated), of great value to steam fitters and architects.

Illustrated Descriptions of notable jobs of Plumbing, Heating, and Ventilating in Private Residences in the United States, including those of Mr. W. H. Vanderbilt and Mr. R. H. Bishop, of New York.

A series of articles on Petroleum Legislation in the United States, by E. G. Love, Ph.D.

A Report to the Greenock Board of Police on the Ventilation of the Sewers of Thirty-three Towns in England, compiled from information received from City Engineers, by Alex. J. Turnbull, C.E. Valuable to engineers and health officers.

Filtration of Sewerage, by Prof. Henry Robinson, M. Inst. C.E., being a report on certain processes.

Hints to Housekeepers, by E. S. Philbrick, C.E. (on the Sanitary Care of Dwellings).

A series of carefully prepared editorials on the Water Supply of New York, discussing the various schemes proposed for increasing it; also the measures to prevent waste. Opinions of prominent English Engineers on the practice in England, and suggestions for American adoption, in connection with a controversy over the rules of the New York authorities with regard to the manner of Flushing Water-Closets. The letters and articles on the question of Valve versus Direct Supply to Water-Closets are of great interest to manufacturers, plumbers, health officials, and water-works engineers.

Description, with illustration, of Methods for Heating Railroad Cars by Steam from the Locomotive, as practiced by certain railways in the United States.

Ventilation of the Packer Institute, Brooklyn. Interesting for school authorities, as showing the methods adopted to ascertain its condition.

Plan, with description, of the proper way to arrange the Drainage of a Villa at Saratoga. Of interest to persons building country residences.

Reports on Adulteration of Food and Drugs in the State of New York, being full abstracts of the reports of Professor Chas. F. Chandler, on Milk (Fresh and Condensed); Professor G. C. Cornwell, on Butter (Dairy and Artificial), Cheese, Lard, Olive Oil and Fruit Essences; Professor A. H. Chester, on Canned Meats and Animal Foods; by Dr. E. G. Love, Ph.D., Cereals and the Products and Accessories of Flour, Special Artificial Food for Infants and Invalids, Baking Powders, Cream Tartars, Alum Powders and the "Alum Question;" by Professor A. S. Lattimore, on Canned Fruits and Vegetables, Vinegar Spices, etc.; W. H. Pitt, M.D., on Sugars, Glucose, etc.; J. E. Englehardt, Ph.D., on Wines, Beers, Spirits and Cordials; by J. Hoffman, Ph.D., on Crude Vegetable and Animal Drugs, Pharmaceutical Chemicals and their Preparations; by Professor Caldwell, on Quinine in Pills and Capsules; by W. G. Tucker, M.D., on Citrate of Magnesia and Seidlitz Powders.

These reports are on examinations made under the direction of the New York State Board of Health with a view of ascertaining the condition of the food and drug supply in the State, and the extent and character of the adulterations practiced. They are valuable to health officials, analysts and manufacturers.

Notes upon some Prosecutions in Great Britain under the Food and Drugs Act, by Alfred Senier, M.D., F.C.S.

Paris Street-Cleaning, by James Tallmadge Van Rensselaer. An elaborate and full account of the system and the cost of its maintenance—of value to city authorities.

Illustration and description of the remodeled Drainage of the Executive Mansion at Washington, D. C.

An account of Fire-Proof Substances for Fabrics and Woodwork.

An article on the advantages of Double Glazed Window Sashes, by General M.C.Meigs, late Quarter-Master General U. S. Army.

Illustration, with explanation, of the Causes of Explosions of Water Backs—for information of householders.

Washington Drainage, a carefully prepared review of the evils complained of, and the various schemes proposed for the reclamation of the Potomac Flats and the sewerage of the city.

The price of the bound volume is $3, with 40 cents postage added; for sale either at the office of *The Sanitary Engineer*, 140 William St., or at this office. The number of volumes is already limited to a very small edition.

CORRESPONDENCE.

CITY IMPROVEMENTS AND MALARIA.

MILWAUKEE, Wis., Sept. 15, 1882.

EDITOR ENGINEERING NEWS:

In your paper of the 9th inst. you copy from the *N. Y. Times* an article on "City Improvements and Malaria," in which occurs the following: "It has long been suspected by the most acute observers that there is an intimate relation between the development of malarial diseases and the setting free of the carbonic acid in the soil; in other words, that intermittent fever and kindred complaints are only another name for slow carbonic oxide poisoning, and that the hypothesis of malarial germs is a purely fanciful mode of accounting for the phenomena associated with these diseases."

In large cement works, the kilns are built in batteries, are continuous, and coal is the ordinary fuel. The carbonic acid of the stone burned is supposed to be set free in large volumes. Yet men work on the tops of the kilns, feeding stone and coal alternately, and necessarily inhaling all the products of the combustion, daily throughout the season, without any apparent injury to health. Accepting the theory of the *Times* as correct, what is the explanation? INQUIRER.

MALARIA IN CONNECTICUT.—Malaria is getting to be Connecticut's worst bugbear, and the shakes in some sections never let up. The State Board of Health, who are trying to get at the source of the trouble, are subjecting the drinking water of these sections to a careful analysis.

SAFETY IN RAILWAY TRAVEL.

We now come to a class of accidents which are perhaps more fatal than any others—the breaking down of bridges. In these catastrophes all horrors combine—crushing, mangling, drowning and burning; and here again our record is not at all encouraging, the number of bridge disasters in the United States having been as follows:

1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
19	33	26	20	21	21	17	16	43

If we left out the first and the last of the above numbers we might flatter ourselves that a gradual improvement was taking place; but what are we to say of the 43 disasters in 1881, which seems to be the worst year we have ever had, and this in spite of the fact that we have been all the time improving our knowledge and our practice of bridge building, and that we certainly know more about such work now than we ever did before.

Railroad bridges, whether of wood or iron, can be so made as to be entirely safe under all ordinary conditions of service, and they can be kept under such inspection that no element of danger shall be allowed to develop itself. While, however, our larger roads as a general thing buy good bridges and keep them under a rigid inspection, many of the smaller roads buy poor bridges and keep them under no inspection at all, for the examination of an iron bridge by the ordinary road-master, or the walking over these structures by railroad commissioners once a year, can hardly be regarded as inspecting. The Ashtabula bridge, which broke down in 1876 on the Lake Shore Railroad, killing over eighty persons, fell, it is stated by the legislative committee appointed to investigate that disaster, "under an ordinary load, by reason of defects in its original construction, which defects would have been discovered at any time after its erection by careful examination," and the report adds: The bridge was liable to go down at any time during the past ten or eleven years, under the loads that might at any time be brought upon it, in the ordinary course of the company's business, and it is most remarkable that it did not sooner occur. Half an hour of competent and honest inspection would have condemned the Ashtabula bridge upon the day it was finished.

The Tariffville bridge—which fell in Connecticut in 1878, killing thirteen persons and wounding thirty-three more—is not an unfair specimen of a large class of wooden bridges in use to-day upon American railroads. In point of design, proportions, dimensions and reputation of its builders, it was fully up to the average of such structures. It had been periodically inspected and pronounced all right. While no competent expert would ever have pronounced it a first-class bridge, no person could say from looking at it that it was not able to carry the ordinary railroad train safely, but when the right combination of circumstances came, it fell, and exposed the hidden defects that caused the disaster. Though nominally a wooden bridge, like all such structures it relied entirely upon wire rods to keep the wood-work together. These rods, it is reported, when tested broke with a single blow of the hammer, very much in the manner of cast iron, and showed a very inferior quality of material. This was a defect which no ordinary inspection would detect, and one which may exist to-day in hundreds of bridges now in use upon our roads. We have in this country no system of control or inspection which can prevent the building and the use of exactly such bridges as that at Tariffville. It may be asked if any railroad company being, of course, aware of its liability for damages—will knowingly allow a defective structure to be made or used upon its road. It is perhaps hardly fair to say that such things are done knowingly, but they are certainly done heedlessly, and the result is the same. Not less than half of the wooden bridges made upon our railroads, and upon many of our best roads, too, are built by mere carpenters who can do just one thing, perpetuate the blunders they have been brought up to. Not one half our wooden bridges have ever been subjected to any computations whatever, but have been proportioned by a kind of guess-work, based upon a greater or less degree of experience it is true, but an experience of a very unsystematic kind. Add to this that nearly all of our older bridges were designed for trains and engines much lighter than those in present use, that there are many disreputable concerns which build very poor and unsafe iron bridges, and railway directors willing to buy such things because they are cheap, and finally that we have no efficient system of inspection, and we need not wonder that 24 bridges on an average break down every year. At the same time, we must bear in mind that there is no need for this class of catastrophes, that any company can at any time buy a bridge of a first-class concern, which shall be guaranteed absolutely safe and permanent by the very best authority.

We can have as much safety as we choose to pay for. As a general thing, the managers of our larger roads are well aware that they cannot afford to run any very great risks; they are intelligent, they are progressive, they are liberal; and we need no better evidence of the skill and care with which railway traffic on the whole is carried on than the fact that not one passenger in a million is killed in this country by any cause for which the company can be held to blame.

Except in one or two States we have no system of public inspection which has ever been able to detect the weak points in a railroad or prevent disasters; and, considering the form of our government, it is quite doubtful if we ever shall have. The way, however, to all desired improvement is very plain, if the public and the companies care enough about safety to exert themselves to get it. We have already seen that the public is itself accountable for by far the larger part of the injuries, and to that extent it must mainly rely upon itself for increased safety. A careful examination of the various causes of railroad accidents shows that three-fourths of all injuries to individuals may be avoided by obeying the following very simple rules: First—Never walk upon a railroad track or bridge. Second—Never cross a railroad without first looking in both directions for a train. Third—Never get on or off the cars, nor pass from one car to another, nor stand upon the platform when the train is in motion, no matter how slow that motion may be. Be especially careful in regard to the above rules when in or about railroad stations, and remember that the disaster, when it occurs, always comes in an unexpected form at an unexpected time.

Of the remaining one-fourth part of all accidents, the control of which is in the hands of the railroad companies, by far the larger part can certainly be avoided by means of the improved methods of construction, maintenance and operation which have been thoroughly tried and demonstrated to be good. Well paid and competent employés whose personal interest is thoroughly enlisted for the welfare of the road, a rigid system of personal accountability—through every grade of service intelligent use of the telegraph, in train movement, well designed, thoroughly built and carefully inspectedt roadway bridges and rolling stock—these are the guarantees for exemption from railroad disasters.—*Geo. L. Vose in North American Review.*

COST OF A BOMBARDMENT.

The papers publish some interesting information as to the cost of each shot of the guns employed in the recent bombardment of the Alexandrian forts. The following is the bill for the discharge of a single round:

Four 81-ton guns	at	£225	10 0	£162	0 0
Ten 25-ton guns	at	7	0 0	70	0 0
Thirty-eight 18-ton guns	at	5	5 0	199	10 0
Sixteen 12-ton guns	at	3	12 0	57	12 0
Eight 9 ton guns	at	2	15 0	22	0 0
Two 6¼-ton guns	at	1	15 0	3	10 0
Four 64-pounders	at	0	18 0	3	12 0
Seven 40-pounders	at	0	12 0	4	4 0
Eighty-seven guns				£462	8 0

When a single round costs nearly £500, what must a day's bombardment have cost?—*Pall Mall Gazette.*

THE GROWTH OF THE UNITED STATES.

Francis A. Walker, the superintendent of the last census, contributes to the October *Century* a paper abounding in interesting and important facts gleaned from the census return since the first enumeration in 1790. In discussing the condition of the United States, at the tenth census in 1880, he says:

The period between 1850 and 1880 has been marked by the astonishingly rapid spread of population over the vast region brought under the flag of the United States by the purchase of Louisiana, the annexation of Texas, and the cessions from Mexico. The 980,000 square miles of territory occupied by settlements in 1850 have become 1,570,000. Of these, 384,820 have between 2 and 6 inhabitants to the square mile; 373,890 have between 6 and 18; 554,300 between 18 and 45; 232,010 between 45 and 90; while 24,550 have in excess 90 inhabitants to the square mile. The population of the United States is now 50,155,783. The frontier line of settlement is, in general, the one hundredth degree of longitude as far north as the forty-second parallel of latitude, and, thence northward, the ninety-ninth and afterward the ninety-eighth degree.

The distribution of the population according to dominant topographical features may be thus stated: On the immediate Atlantic coast, north, 2,616,892; middle, 4,375,184; south, 875,387; on the Gulf coast, 1,055,851; in the hilly and mountainous region of the northeast, 1,669,226; in the mountainous region of the central Atlantic slope, 2,344,223; in the immediate region of the Lakes, 3,049,470; on the table-lands and elevated plateaus of the interior, 5,716,326; in the south central mountainous region, 2,695,085; in the Ohio Valley, 2,442,792; on the south interior table-lands and plateaus, 3,627,478; in the Mississippi belt, south, 710,268; north, 1,991,362; in the southwest central region, 2,932,807; in the central region, 4,401,346; in the prairie region, 5,722,485; in the Missouri River belt, 835,455; on the western plains, 323,819; in the heavily timber region of the northwest, 1,122,337; in the Cordilleran region, 932,311; on the Pacific coast, 715,789.

Although the territory of the United States extends to the forty-ninth parallel, only one-tenth of the population is found north of the forty-third. But so dense is the settlement below this line that, by the time the forty-first parallel is reached, about one-third of the population has been covered; the next single degree extends the proportion nearly to one-half, while more than two-thirds lie north of the thirty-eighth parallel. Between the forty-third and the thirty-eighth dwell 29,500,000 of our people. In 1870, 52.8 per cent. of the population was east of the eighty-fourth meridian. In 1880, only 49.4 per cent. was so placed. Eighty-four per cent. of the population is found east of the ninety-first meridian; 97 per cent. east of the ninety-seventh.

The foreign elements of our population have varied widely since 1850. At that time foreigners constituted 9.5 per cent. of the total population; they now constitute 13.3 per cent. Of the foreign residents of 1850, 43.5 per cent. were Irish; 26.4, Germans; 13.9, English and Welsh; 6.7, British-Americans; while the Scandinavians formed less than one per cent. Since that time, the proportion of Irish to the other foreign elements has steadily declined. Of the arrivals in the ten years ending in 1850, the Germans were but 25 per cent.; of those in the ten years ending in 1860, they were 37 per cent. Between 1860 and 1870, other foreign elements began to assume importance through the fast-increasing immigration of Swedes and Norwegians across the ocean, and of Canadians across our northern border. We have seen that the Irish of 1850 constituted 43.5 per cent. of the total foreign population. In 1860, this proportion had fallen to 38.9, and in 1870, still further, to 33.3. Although the statistics of nationality at the census of 1880 are not yet published, it is not probable that the Irish to-day constitute more than 27 per cent. of the foreign population of the country.

To-day, the number of foreigners living among us is a little over 6,500,000, while the members of the colored race reach almost the same number. Speaking roundly, then, the following is the table of our population:

Whole number	50,000,000
Foreigners	6,500,000
Total native-born	43,500,000
Colored	6,500,000
Total native-born whites	37,000,000

The location of the colored and the foreign elements of our population, as shown by the census, is, in a high degree, complemental. In general, where the one element is largely found, the other is absent.

The *North American Review* for October opens with an article on "The Coming Revolution in England," by H. M. Hyndman, the English radical leader, giving an instructive account of the agitation now going on among the English working classes for a reconstruction of the whole politico-social fabric of that country. O. B. Frothingham writes of "The Objectionable in Literature," and endeavors to point out the distinction between literature which is *per se* corrupting, and that which is simply coarse. Dr. Henry Schliemann tells the interesting story of one year's "Discoveries at Troy." Senator John I. Mitchell, of Pennsylvania, treats of the rise and progress of the rule of "Political Bosses." Prof. George L. Vose, of the Massachusetts Institute of Technology, contributes an article of exceptional value on "Safety in Railway Travel," and Prof. Charles S. Sargent, of the Harvard College Arboretum, contributes an instructive essay on "The Protection of Forests." The *Review* is sold by booksellers and newsdealers generally.

NOTES.

PATENTS GRANTED DURING THE WEEK.

WASHINGTON, Aug. 22.—During the week ending to-day there have been granted at the Patent Office 389 patents, 68 designs, 11 trade-marks, 10 labels and 4 reissues of patents. The states receiving the largest number were New York, 106, 21 of which were granted to T. A. Edison; Massachusetts, 52; Pennsylvania, 37; Ohio, 34; Illinois, 32; New Jersey, 31; Michigan, 14; Connecticut, 13. Twenty patents and designs were granted to citizens of foreign countries, of which number England and Canada received 7 each.

AN IMPORTANT INVENTION.

J. B. Atwater, of Chicago, an inventor of some prominence, has received patents on an unique motor. It is founded on this principle: The poles of an electro-magnet are changed to a point distant from where they are usually located. By this transfer a stroke of from 5 to 30 in. is secured in a reciprocating or an oscillating engine, without breaking the current which connects the battery with the motor. With the greatly increased

power thus gained there is no increased battery necessary. The power gained is said to be continuous and the cost is at a minimum. The machine will shortly be placed on exhibition. Scientific men agree that many of its principles are new to science, and that it may work a revolution in motors.

THE TWO COUNTRIES—

There is a land of tears and bitter wailing—
A land most like that drear one Dante knew,
Where wan-faced Niobes, with dark robes trailing,
In sad procession move, brow bound with rue.
It is a land peopled by witless mortals—
Compared with them the Virgins five were wise—
And it is writ above its gloomy portals:
"We did not think it paid to advertise."

There is a land that flows with milk and honey—
Not the condensed nor yet the sorghum strains—
Each dweller bears a gripsack fat with money,
Bonds, coupons, stocks and various other gains.
Happy are these as, at high tide, the clamlet;
No tear doth drown the laughter in their eyes;
For better luck they'd not donate one damlet:
The pastry's theirs—they learned to advertise.

Hatboro Public Spirit.

RAILROAD BUILDINGIN THE NORTHWEST.

[Puget Sound Courier.]

A correspondent who recently visited the "front" describes some of the difficulties of railroading in the Northwest. This is about the way it is done: The line having been laid, surveyed and staked, parties of white men, hundreds in a gang, proceed to mow down the forest. The trees are felled with surprising rapidity—it might be said that they are mowed down—and a broad swath, 200 feet wide, is opened up through the forest. The trees are immediately trimmed and cut into lengths and rolled out of the way, when other gangs of men attack these logs and split them into ties. Now comes another party of white men, who proceed to dig about the roots of the fallen trees; a keg (sometimes two) of powder is placed under the tree stump, a fuse attached, earth thrown about it and tramped down, a light attached to the fuse, and the stump is blown up. The white men pass on, and now come the Chinamen, thousands of them. They proceed under the direction of white bosses or "herders," as they are called, to level the earth, throw up a road-bed, carry ties from a construction train, or from teams close by, and lay them in place. Other gangs of Chinamen carry steel rails, and white men proceed to lay them and spike them. The supply train slowly moves forward as the track is laid, and other gangs of Chinamen follow on a gravel train and finish the new laid track. Thus the new railroad is being built towards the Mississippi River at St Paul.

GENERAL INTELLIGENCE.

☞ *We solicit and are always pleased to publish in these columns any items of interest that may be furnished us.*

GAS AND WATER.

INCREASING GREENFIELD'S, MASS., WATER SUPPLY.—The committee who have been investigating the question of an increased supply of water for the town have reported. Raising the Glen reservoir 6 ft., at an expense of $4,000, which would increase the capacity of the reservoir several million gallons; also, building a reservoir on Rocky mountain, east of the village, which is 168 ft. above the arch on Main st., and running a pipe from the present Glen water main to the reservoir, which could be filled during the night. The water from this reservoir should be used for fires, for the railroads and for mechanical purposes, and it could be shut off in case of fire, so as to make the whole supply available. This would involve a total expense of $34,000. It is thought that this plan would give the town an ample supply for many years. The committee investigated various schemes, among others the West Glen brook and the pond at "Carpenter's mill." There was not sufficient water to warrant any movement in that direction. It is thought that it would not be advisable to lay larger pipes to the present water-works, which would involve an outlay of $80,000. It would cost $75,000 to try the Fish brook plan, though it is likely that this may be adopted, should the town need a much larger supply in future years. This brook has two branches, one rising in the town of Shelburne and the other in Coleraine, and so located that a head of 430 ft. could be obtained.

A WATER-WORKS PAYING DAMAGES.—The town of Westboro', Mass., has been required to pay $5,834.25 to parties who had rights in a stream which the town diverted to fill a reservoir.

WATER FOR SWAMPSCOTT, MASS.—The Flax Pond Water Company, through its President, Charles Lincoln, of Boston, offers to give Swampscott a supply of water from Cedar, Sluice and Flax Ponds. No definite action will be taken on the water question until the Lynn Water Board and the Swampscott Water Company are further heard from.

THE COLUMBUS WATER-WORKS, GA., are nearly completed.

GROUND was broken and work begun on the Spencer, Mass., water-works Monday, 11th inst., by the contractors, Messrs. Goodhue & Birnie.

THE Fifth avenue reservoir, in New York, is not to be removed.

ELECTRICITY.

EDISON tells a reporter that he does not believe a submarine telephone comes within the region of possibilities. He says: "The present condition of the art will not permit sound to be audible by submarine or underground conveyance more than a few miles. It is all they can do to talk across the English Channel, and that with the very best instrument yet constructed."

KISSING THE BIBLE BY TELEPHONE.—John Freeman, assistant book-keeper in the Department of Public Works and notary public, before whom the various foremen are required to swear that the pay-rolls submitted by them are correct, took the affidavit of Wm. Inness, foreman of repairs at the crib, by telephone. Having called the crib, the following colloquy ensued:

"Is this William Inness?"

"Yes."

"I hold in my hand the pay-roll submitted by you for the month of August. Are you willing to swear that it is correct?"

"I am."

"Take off your hat and hold up your right hand."

"I have done so."

"You solemnly swear that the August pay-roll for repairs at the crib is correct?"

"I do."

Mr. Freeman readily distinguished Mr. Inness' voice and says an oath taken by telephone is binding in law. *Chicago News.*

The Edison Lamp Factory has recently been removed from Menlo Park, the inventor's home, to East Newark, N. J., to secure larger buildings, increased facilities, and more convenient accommodation for workmen. The tools and power now in the factory are sufficient for the manufacture of 1,200 lamps per day, but the ultimate capacity is stated to be 40,000 lamps per day, requiring from 3,000 to 4,000 workmen.

THE validity of the Bell telephone patent in Canada has been tested in its favor.

STREETS, DRAINAGE, ETC.

SEWER WORK DELAYED.—New Haven has sewer work to the amount of $70,000 delayed for the want of money.

SANITARY INSTRUCTIONS TO BRITISH ARMY.—The sanitary instructions sent in pamphlet form to the British army in Egypt say that camps should not be made on ground that has recently been flooded, nor should the surface be dug up more than is absolutely necessary for drainage. If turbid water must be used it should be allowed to clear itself as much as possible by subsidence, and a teaspoonful of powdered alum added to every ten gallons. The filtering of the water where possible is urged, and any water can be drunk if first boiled and then allowed to cool. Stringent directions are given that in cases of cholera or enteric fever all water is to be boiled before use, and distillation adopted if practicable. In the matter of food, it is advised that all meat be thoroughly cooked; that the consumption of vegetables and fruit be encouraged. As to beverages, strong alcoholic drinks are condemned, red wine is permitted, and tea, coffee, and cocoa are recommended. It is declared that tea is especially valuable where water is at all doubtful in quality, cold tea, with a little sugar and lime juice, being an antiscorbutic and making a refreshing drink.

PROPOSALS WANTED.—Orange, N. J., advertises for bids for 5,100 lineal ft. of curbing; 1,570 square yards of cobble stone gutters; 10,850 square yards of macadamizing, and 5,000 cubic yards of earth and rock excavations. Bids received until Oct. 2.

RIVERS AND HARBORS.

IMPROVING THE POTOMAC FLATS.—WASHINGTON Sept. 21.—Major Haines having submitted his plan for the improvement of the Potomac flats to the Chief of Engineers, that officer approved it and submitted it to the Secretary of War, with the recommendation that the work be done by contract by the lowest bidder after due advertisement for proposals. The plan was approved by Secretary Lincoln yesterday. Three objects are to be accomplished by the proposed improvement—the improvement of navigation, the establishment of harbor lines and the raising of the flats. The first of these objects is to be accomplished by dredging a channel from Easby's Point, near Georgetown, to near Giesboro Point, below the arsenal, and from Giesboro Point to Long Bridge, in the Washington Channel, of such a width and depth as will accommodate the largest class of vessels that can reach Giesboro Point.

The second, the building of a bulkhead which will commence near Easby's wharf and extend in a curved line to a point at or near the southerly end of the causeway of Long Bridge, thence continuing to a point at the intersection of the Washington and Georgetown Channels below the wharf of the United States arsenal, thence returning along the westerly side of the Washington Channel in front of the city wharves, and about 800 feet distant from them to Long Bridge. The third will be accomplished by depositing on the flats the material taken from the dredged channels, and such other material as it may be expedient to take from other places.

The estimated cost is $2,716,509.

RAILROADS.

TO BEGIN CONSTRUCTION.—The construction of the new Michigan, Indiana & St. Louis Railroad will shortly be commenced. It will be 166 miles in length and will run from Sturgis, Mich., to Danville, Ill., where it will connect with the Danville & East St. Louis road to St. Louis. The capital stock is $2,500,000. The officers of the road are: President, John Lee, of Crawfordsville; Vice-President, W. H. Beckwith, of Danville; Secretary, S. E. Thomas, of Michigan.

MR. JEWETT ON THE ERIE RAILROAD.—"When I took charge of the Erie Railroad five years ago I said that it would require ten years of labor in it to make it even respectable for a man to be at the head of it. Five years have passed, and we have a railroad second to none in the country, and I think you will pardon my confidence," said Mr. Jewett, "that we now have the first railroad in the United States, notwithstanding the better financial condition in respect to dividends of our two great rivals. And in five years more," continued Mr. Jewett, his blue eyes dilating an instant, "I believe that we shall pay dividends on the whole of our stock regularly."—*Cincinnati Enquirer.*

SURVEYING A NEW ROAD IN NEW JERSEY.—A survey for a new railroad between Long Beach and Manahawkin has been made, so as to secure direct railroad communication with Long Beach and the several seaside resorts between Barnegat and Sea Haven. Surveys are also to be made for an air-line direct from Philadelphia to Long Beach. These roads will open an entirely new section of the New Jersey sea-coast.

NEW ROAD.—A railroad is to be built from a point in Coahoma county, opposite Helena, Ark., through Sardis, Oxford, Pontotoc east to Birmingham, Ala.

THE Georgia Pacific has been completed from Atlanta to Ringer's cross roads, 45 miles. Nearly all the grading has been done between Ringer's Cross Roads and Anniston, Ala., and in October will begin the running of trains through to that place. All the rails have been ordered and are arriving daily, and the work on the road is being pushed as rapidly as possible. The work between Anniston and Birmingham is let and the contractors are getting on the ground every day, and soon the workmen will be swarming along the line. The 35 miles of the road east from Columbus to the line of Walker county have been let and work commenced. Thirty miles of the road have been completed from Greenville, Mississippi, to Johnsonville, and a branch road 20 miles long has been completed from Stoneville to Sharkey. A short piece of the line has been completed eastward from Columbus to Fern Bank. The entire road, from Atlanta to Greenville, Miss., will be 462 miles, and of that 262 miles have been let and partially completed.

MEXICAN RAILROAD PROSPECTS.—Hon. John Bigelow has, in the October number of *Harper's Magazine*, an article entitled "The Railway Invasion of Mexico," in which he discusses at some length the prospects of the subsidized railroad now being built in Mexico by American companies and capital. He sums up as follows:

"1. Voluntary emigration cannot be relied upon to any appreciable extent.

"2. Railways must depend mainly upon the transportation of the products of Mexican industry, and of the purchasing power of its surplus in foreign markets. The railway business, therefore, cannot increase rapidly nor endure much competition.

"3. To make railways at all remunerative in Mexico they must be constructed and run with the closest economy and system. There will be no margin for extravagance or roguery.

"4. There are so many elements of uncertainty to be reckoned with in these investments, especially if made under the auspices and in the special interest of foreigners, that, while they would unquestionably prove highly advantageous to Mexico, and might ultimately prove highly remunerative to stockholders, at present they should be *caviare* to all who have not money to invest which they can afford to lose."

CONTRACTS LET.

The Sullivan Machine Company, Claremont, is getting out about $23,000 worth of machinery for the manufacture of asphalt pavement. This machinery will be shipped to Sidney, Australia.

PAINTING CONTRACT LET.—The contract for painting the exterior of the White House and the exterior of the conservatory has been awarded to Fred. S. Newman, of Washington, for $1,254.80, he being the lowest bidder.

CONTRACTS for the building of the Canton, Aberdeen and Nashville Railroad, will be awarded in sections of five miles each.

AWARD OF BIDS FOR ENGRAVINGS.—The following named bids were opened at the Government Printing Office on Saturday last for engravings, etc.; Heliotype Printing Company, $25,000; Major & Knapp, New York, $20,824.65; Forbes, Boston, $20,000; Sinclair, Philadelphia, $16,873; Schoeffel & Edwards, $12,835; Nan Arx, New York, $11,985; A. Hoen & Co., Baltimore, $10,265; Hartt, New York, $7,524; M. Joyce, Washington, $5,247.70. The contract was awarded to Sinclair, of Philadelphia.

THE bids for the construction of a new penny bridge ever Newtown Creek, in place of the one destroyed by the great oil fire last week, were opened by the Bridge Committee of the Supervisor's of Queens and Kings Counties. The lowest bid was that of S. A. Kelley for $26,000.

BUILDING.

CAR WORKS BURNED.—The Missouri Car and Foundry Works, in the southern part of St. Louis, were burned on the 15th. Loss estimated at $150,000.

BIDS RECEIVED FOR HEATING APPARATUS.—The following bids were received for heating apparatus for the United States Court and Post Office, Philadelphia: Phœnix Iron Company, Trenton, N. J., $21,750; Bartlett, Hayward & Co., Baltimore, Md., $23,448; Hilles & Jones, Wilmington, Del., $26,443; John Baisley, Philadelphia, $33,128.25.

R. M. KENNEDY, of Second and Wood streets, Pittsburgh, Pa., invites proposals for 200 frame dwelling houses.

BRIDGES.

THERE are over 1,400 bridges in the Illinois Division of the Wabash R. R.

MISCELLANEOUS.

ELEVATION TAKEN.—Mr. E. B. McNeill, civil engineer, has just taken the elevation of Litchfield, Conn. He finds it is 1,113.80 ft. above tide water.

A trial of the Fleuss Breather in the German coal mines has proved a decided success, and the German government propose to take the invention in hand and make it a leading feature in the Mining Exhibition, which will be held early next year in place of the one destroyed by fire this year. The address of Mr. J. B. Brown, agent for Fleuss, Duff & Co., is changed to 95 and 97 Liberty street, New York.